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## THE GENUS *ILEX* IN TENNESSEE<sup>1</sup>

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### INTRODUCTION

WHILE on an extensive collecting trip during the fall of 1949, the writer had an unusually good opportunity to observe variation in numerous species of plants and to make extensive collections of certain groups under critical observation. The genus *Ilex* was one of the most interesting. It was found that the limitations imposed by the descriptions available excluded certain forms of the various species. Therefore, a revised approach to classification seemed to be necessary to replace the rigid descriptions in use. This does not mean that entirely new descriptions should be drawn up, but that the ones in use should be extended and modified to keep pace with the dynamic taxonomy of the present day. This study represents a step in that direction with reference to the Tennessee material.

The genus *Ilex* is geographically interesting. It is world wide in distribution and in some instances the same species occur in both Asia and eastern North America. Such a cosmopolitan distribution makes a detailed study of the entire genus on a field basis nearly impossible. Yet, the character of the populations is such that field study is necessary before sound taxonomic conclusions can be reached. It follows, then, that the conclusions of such a study as the present one must be tentative and must be considered to apply in particular to the Tennessee material.

Field study, including adequate sampling of local material, careful habitat notes, and ecological observations, are especially

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essential to an understanding of the genus *Ilex* in Tennessee. Here there are no discontinuities of morphological characteristics, but gradual clines exist from the basic species into the various varieties and forms. This lack of distinct morphological disjunctions often makes determinations difficult.

Since it is not possible, then, to successfully assign the individuals in the Tennessee populations to traditionally and strictly defined species, it has been the practice of the writer to state his interpretation of the range of variability of each of the species recognized. The *variety* will be used as a designation for subspecific groups of two types: one, for segregates which are geographically disjunct, and two, for segregates which are morphologically distinct but which are not disjunct. The *form* is used to describe the extreme ends of clines which are found within the known range of the species.

#### ACKNOWLEDGEMENTS

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The curators of the herbaria at the following institutions have graciously permitted the use of material in their care:

University of Alabama (ALA); U. S. Forest Service Herbarium, Washington (FS); Gray Herbarium, Harvard University (G); George Peabody Teachers College (GP); Missouri Botanical Garden (M); U. S. National Herbarium (NH); Park Headquarters Herbarium, Great Smoky Mountains National Park (PH); University of the South (S); University of Tennessee (T); University of Chattanooga (UC); University of North Carolina (UN).

#### HISTORICAL ACCOUNT

The name *Ilex* is the one originally proposed for the genus. Since its proposal in 1735, by Linnaeus, at least nineteen others have entered the literature. Of these, *Prinos*, proposed in 1737 by Gronovius, has enjoyed the second greatest popularity. Under present rules of nomenclature, *Ilex* is the proper name.

In 1838, Rafinesque perpetrated a masterpiece of splitting when he divided the genus into five new segregate genera. It is, perhaps, not strange that a genus with such a wide variation in leaf type should have been so often divided into smaller groups.

The only major monographic study of the North American species of *Ilex* was published in 1901 by Loesener. The weakness of his treatment of this genus reflects the complexity of the populations and the necessity for field work.

#### ECONOMIC IMPORTANCE

All of the species of holly that occur in Tennessee, with the exception of *Ilex opaca* (American Holly), are of little commercial value. However *Ilex decidua* probably has some economic value as a soil holder when it grows along streamsides. *Ilex opaca* is valued for its creamy white wood and for its leaves. The wood is used for furniture inlays, handles, and various fixtures, often being dyed black to imitate ebony. Its leaves and fruits are highly prized for wreath making and decorations at Christmas-time, and some of the most beautiful plants of this species have been wantonly destroyed for this purpose.

#### PROCEDURES

Wherever it was possible, specimens collected and notes made on field trips were used. However, it is always desirable to compare these data and make use of specimens collected by other workers. When this is done, the problem of maintaining a given set of standards as to varying degrees of pubescence, color, leaf texture, and other characteristics, becomes apparent. Specimens which were studied the year, month, or even the week before may be judged by standards which differ slightly from the ones being used at the present time if reference standards are not used.

For this reason, a standardized check sheet (see fig. 1) was prepared and used for approximately three hundred specimens. On this sheet were first recorded the complete collection data. Next the plant specimen was examined. All characteristics regarded as being important were standardized and units of length, shape, size, texture, etc., were assigned to each. For varying degrees of pubescence and for leaf shapes, standard specimens were selected and mounted under glassine covers. By doing this, the same objective standards were used during the entire period of study and a complete record of all specimens studied was readily available at any time. This proved helpful after specimens borrowed from other herbaria were returned.

In citing specimens, one collection from each county is used.

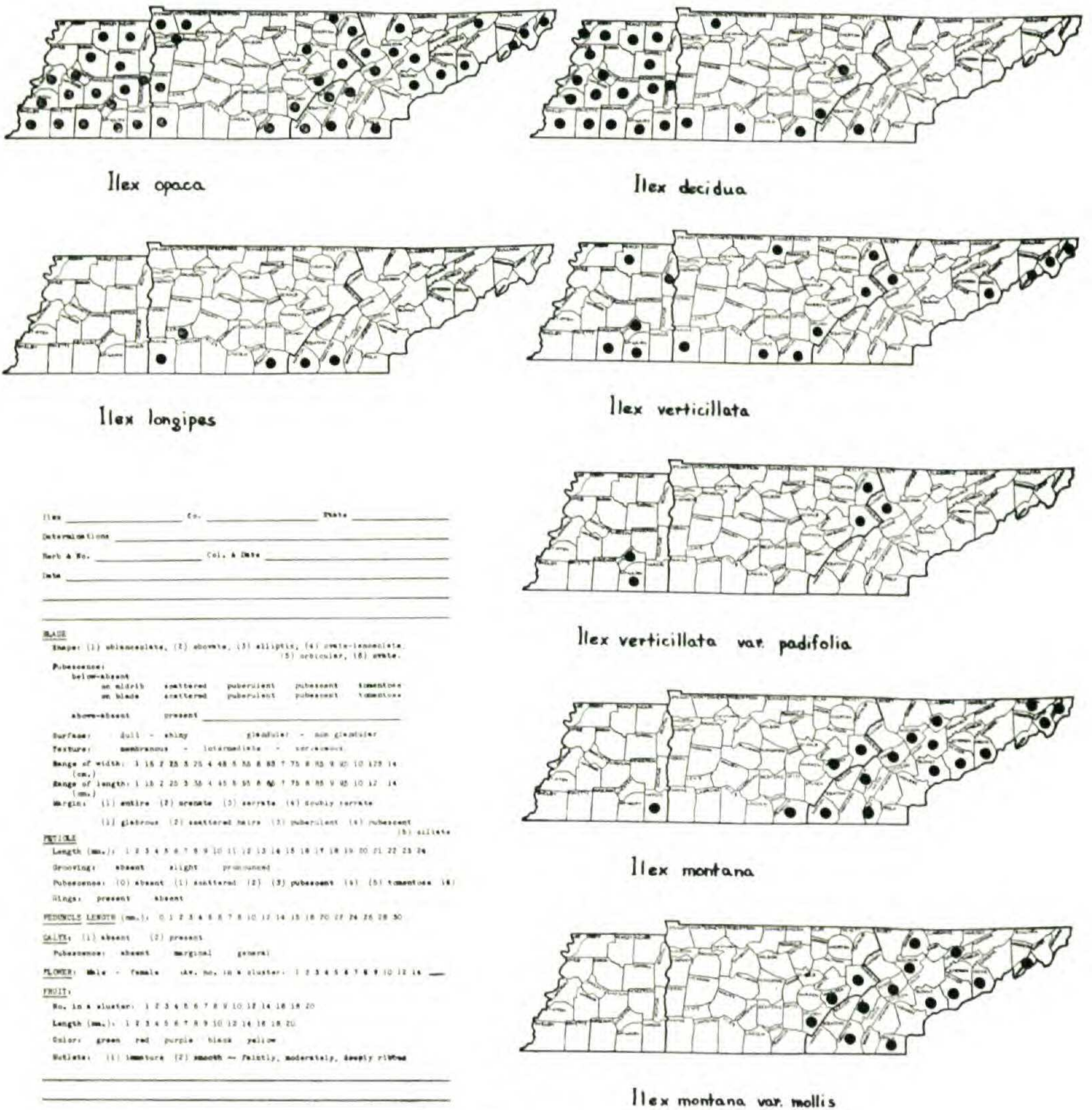


Figure 1

SYSTEMATIC TREATMENT

ILEX, (Tourn.) Linn., Syst. ed. I (1735). Sp. Pl. (1753).

*Prinos*, Gronov. in Linn., Coroll. Gen. 6 (1737). *Aquifolium*, (Tourn.) Adams, Fam. II (1763). *Macoucoua*, Aubl., Pl. Gui. I (1775). *Labatia*, Scop., Introd. (1777). *Othera*, Thunb., Nov. Gen. (1783). *Winterlia*, Moench, Meth. (1794). *Paltoria*, Ruiz and Pav., Prod. 13 (1794). *Hexotria*, Rafin., Am. Monthly Mag. IV (1818). *Chomelia*, Vell., Fl. Flum. I (1827). *Ageria*, Rafin., Sylva Tellur. (1838). *Arinemia*, Rafin., ibid. *Braxylis*, Rafin., ibid. *Ennepta*, Rafin., ibid. *Synstima*, Rafin., ibid. *Prinodia*, Griseb. in Goett., Abh. VII (1859). *Pileostegia*, Turcz., Bull. Soc. Nat. Mosc. 32 (1859). *Leucodermis*, Planch. in Benth. and Hook., Gen. Pl. I. (1862). *Pseudehretia*, Turcz., Bull. Soc. Nat. Mosc. 36 (1863).

Shrubs or trees. Leaves alternate, simple, deciduous or persistent. Flowers white, 4-8-merous, imbricated in the bud, borne in the axils of the leaves; calyx persistent; stamens adnate to the base of the corolla. Fruit a 4-8 seeded drupe, usually red.

ARTIFICIAL KEY TO THE SPECIES OF *ILEX* FOUND IN TENNESSEE

- a. Leaves evergreen and coriaceous, usually armed with stiff marginal spines.....1. *I. opaca*.
- a. Leaves not evergreen or coriaceous, marginal spines never present....b.
- b. Calyx 4-merous and glabrous; leaf margins crenate or nearly entire....c.
- c. Pistillate peduncle much longer than the fruit or flower; nutlets smooth or faintly ribbed.....2. *I. longipes*.
- c. Pistillate peduncle shorter than or equal to the fruit or flower; nutlets strongly ribbed.....3. *I. decidua*.
- b. Calyx 4-7-merous and with varying degrees of pubescence; leaf margins serrate or doubly so....d.
- d. Calyx pubescence mainly ciliate; nutlets smooth; found in wet habitats (bogs and stream banks).....4. *I. verticillata*.
- d. Calyx pubescence more general; nutlets with striate ridges; found in well drained habitats.....5. *I. montana*.

1. *Ilex opaca* Soland. in Ait. *Ilex Aquifolium* Marsh., Arbust. Am. 63 (1785). *Ilex canadensis* Marsh., Arbust. Am. 64 (1785). *Ilex laxifolia* Lam., Encyc. III (1789). *Ilex opaca* Soland. in Ait., Hort. Kew. ed. I (1789). *Ilex americana* Lam., Jour. Hist. Nat. Par. I (1792). *Ilex quercifolia* Meerb., Icon. Sel. 2, t. 5 (1798). *Ageria opaca* Rafin., Sylva Tellur. 47 (1838).—Shrub or tree up to 50 feet tall; leaves evergreen, elliptic to ovate, dull above, lighter green and glabrous below, coriaceous, armed with many marginal spines or with few or none in forma *subintegra* Weath.; calyx 4-merous and remotely ciliate; drupes red, or yellow in forma *xanthocarpa* Rehd.; nutlets grooved.

*Distribution:* *Ilex opaca* is found in all of the physiographic provinces of Tennessee with the exception of the Central Basin. Its distribution in the Highland Rim is limited to the more moist sites. *Specimens Examined.*—ANDERSON: Oliver Springs, *Jennison 3270* (T); BLOUNT: pine-oak woods, Russell Field, GSMNP, *Jennison 1570* (PH, T). CAMPBELL: Jellico, about 1000', sandy loam in moist small growth woodlot, *Lamb & Williams, July 30, 1934* (T). CARROLL: bottoms of Big Sandy River SE of Buena Vista, *Sharp, Clebsch & Clebsch 8494* (T). CARTER: swamp along Stony Creek east of Elizabethton, *Sharp, Fairchild & Clebsch 11748* (T). CHESTER: gum swamp 3 miles N. of Henderson, *Woods, Shanks & Hardin 15728* (T). COCKE: with *Rhododendron maximum* on well drained slope, *Woods 15363* (T). CUMBERLAND: in gorge of Ozone Falls, *Shanks, Woods & Cooley 13868* (T). FRANKLIN: Alto Road, *P. H. W. Webb 223* (T, S). HAMILTON: Signal Mountain, Chattanooga, *Sharp, Hesler & McGilliard 1042* (T). HARDEMAN: Hatchie River bottoms near Pocahton, *Woods, Shanks & Cooley 14643* (T). HARDIN: upland oak forest, Shiloh National Military Park, *Woods, Shanks & Hardin 15692* (T). HAYWOOD: dry oak woods on hill near Eureka, *Sharp & Clebsch 6721* (T). HENDERSON: dry slope near Cub Lake, Natchez Trace State Park, *Sharp, Clebsch, Clebsch & Fairchild 9342* (T). JOHNSON: Cole's Bog near Shady Valley, *Shanks 1110* (T). KNOX: Knoxville, *Miranda Berry 1, 1896* (T). LAUDERDALE: woods in creekbottom west of Halls, *Sharp, Clebsch, Clebsch & Fairchild 7998* (T). MADISON: roadside bank north of Big Springs, *Sharp, Underwood & Clebsch 6844* (T). MCNAIRY: moist soil along creek north of Stantonville, *Sharp, Clebsch & Clebsch 185* (T). MORGAN: Clear Fork River, Rugby, *Jennison, Sharp & Hesler 1189* (T). POLK: lower

part of Smith Mt., *W. A. Dayton 722* (FS). RHEA: Edwards branch of Soak Creek above Little Piney, *Woods, Shanks, & Cooley 14015* (T). ROANE: Rockwood, *D. M. Coffman 101* (NH). SEVIER: Rich N. slope on Webb Creek, *Woods 15362* (T). SHELBY: Wolf River bottoms, *C. E. Moore H548* (T). WAYNE: SE. of Collingwood along Holly Creek, *Sharp, Clebsch & Clebsch 4979* (T). WEAKLEY: bottoms of Middle Fork of Obion River NE. of Greenfield, *Sharp, Clebsch & Fairchild 7803* (T).

Perhaps no other tree in the United States is familiar to so many people as *Ilex opaca*. It is found in sites which vary from fairly dry woods to the edges of creeks and in swamps. Its coriaceous leaves belie its truly mesic nature. Its exclusion from the Central Basin of Tennessee is indicative of the often excessively drained condition of the soil in that part of the state.

*Ilex opaca* was described by Solander in Aiton's *Hortus Kewensis* ed. I in 1789. In the past, it has been the practice to cite the authority as Aiton, when naming the species. The writer suggests that in the future, Solander be given proper credit.

**2. *Ilex longipes* Chapm.** *Ilex longipes* Chapm. in Trelease, *Trans. Acad. Sci. St. Louis V* (1889). *Nemopanthes canadensis* Gatt., *Tenn. Flora 31* (1901).—Shrub; leaves deciduous, elliptic to obovate, glabrous or with dense pubescence on midrib below, dull above, subcoriaceous, faintly to remotely serrate; pistillate peduncles 13–20 mm. long, longer than the staminate; calyx glabrous, 4–5-merous; drupe red; nutlets faintly to deeply ribbed.

*Distribution:* In the south-central part of the state. Found in habitats which vary from thin limestone soil to moist creeksides. *Specimens Examined.*—FRANKLIN: Cowan, *A. Gattinger, August 13, 1886*. HAMILTON: Lookout Mt., *McGilliard, September 17, 1931* (UC). LEWIS: moist soil near Hohenwald, *Charlesworth 3323* (T). MARION: top of Walden Ridge, *Ford & Russell 2231* (T). WAYNE: Along Butler Creek, NW. of Iron City, *Woods, Shanks & Cooley 9155* (T).

This is the least known of all of the species of Tennessee hollies, partly because of its limited distribution and partly because of the lack of collecting in areas in which it is present. The single collection made by the writer was beside a creek in a moist boggy site. This is in sharp contrast with the habitats in which other collections have been made, indicating a wide range of ecological amplitude. With such a large variety of sites represented from which the few collections have been taken it is strange that more plants have not been found.

**3. *Ilex decidua* Walt.** *Ilex decidua* Walt., *Fl. Carol.* (1788). *Ilex prinoides* Soland. in Ait., *Hortus Kewensis* ed. I. (1789). *Ilex aestivalis* Lam., *Encyc. iii*; and in *Jour. Hist. Nat. Par. 1* (1792). *Ilex tenuifolia* Salisb.,

Prodr. (1796). *Bumelia crenulata* Spreng., Syst. I (1801). *Ilex ambigua* Ell., Sketches ii (1824). *Prinos deciduus* DC, Prodr. II (1862). *Prinos deciduus* var. *aestivalis* (Lam.) DC, Prodr. II (1862).—Shrub up to 25 feet high; leaves deciduous, spatulate or oblanceolate to elliptical, pilose to pubescent on midrib below, dull above, membranous to sub-coriaceous, crenate to obtusely serrate; staminate peduncles longer and thinner than the pistillate; calyx square and glabrous; drupes red; nutlets deeply ribbed.

*Distribution:* Western and central Tennessee in low wet thickets, bottoms and boggy habitats as far east as White County. It may be found at times on well drained sites. *Specimens Examined.*—BENTON: high bottoms of the Tennessee River, Woods, Shanks & Hardin 15626 (T). CARROLL: bottoms of Big Sandy River SE. of Buena Vista, Sharp, Fairchild, Clebsch & Clebsch 8467 (T). CROCKETT: bottoms of the Middle Fork of the Forked Deer, Woods, Shanks & Cooley 14745 (T). DECATUR: bottoms along Sick Creek near Cozette, Woods, Shanks & Cooley 14929 (T). DYER: in cultivated field under *Quercus macrocarpa*, Woods, Shanks, & Hardin 15651 (T). FAYETTE: Roper farm near Loosahatchie River north of Warren, Woods, Cooley, & Shanks 13331 (T). FRANKLIN: rocky limestone slope S. of Sewanee, Sharp 1296 (T). GILES: roadside south of Pulaski, Sharp, Clebsch, Clebsch & Fairchild 9799 (T). GRUNDY: gravels of Collins R., Tarleton, Svenson 9378 (T, NH); HAMILTON: Soddy, A. Bryant & McGilliard, July 7, 1949 (UC). HARDEMAN: Hatchie River bottoms near Pocahontas, Woods, Shanks, & Cooley 14631 (T). HARDIN: near Saltillo, 25 feet high, Woods & Clara Davey 14586 (T). HAYWOOD: near Lost Creek east of Forked Deer, Woods, Shanks & Cooley 14750 (T). HENDERSON: bottoms of Beech River SW. of Chesterfield, Sharp, Clebsch, Clebsch & Fairchild 9281 (T). HENRY: near Jones Mill in wet bottoms, Sharp, Clebsch & Clebsch 6101 (T). LAKE: Choctaw Island, Reelfoot Lake, Shanks 1251 (T). LAUDERDALE: mesic slope above Mississippi bottom west of Arp, Woods, Cooley & Shanks 13618 (T). MADISON: roadside bank N. of Hunterville, Sharp, Adams & Felix 12540 (T). MCNAIRY: roadside bank SW. of Pocahontas, Sharp, Clebsch & Clebsch 159 (T). MONTGOMERY: dry wooded hillside 2 miles east of Clarksville, Woods & A. Clebsch 14473 (T). OBION: edge of Reelfoot Lake, D. E. and M. S. Lyles 8391 (G). SHELBY: Loosahatchie River bottoms near Lucy, Woods, Cooley & Shanks 13511 (T). TIPTON: Covington, James Byars, October 12, 1888, (NH). WAYNE: bluff along bottomland forest, W. B. McDougall 1626 (NH). WEAKLEY: roadside ditch near Palmersville, Sharp, Clebsch & Clebsch 6088 (T). WHITE: rocks at edge of river below Great Falls Dam, Shanks, Sharp, & E. Clebsch 5588 (T).

The variability in the leaf shape, size, and texture of *Ilex decidua* is great and one must study the field populations carefully in order to understand the species as an entity. For an example, the writer has made collections of different plants from the same populations. An open-grown plant (Woods, Shanks, and Cooley 14916), from which collections were made, has leaves that are smaller in size and more ovate than the leaves of a shade-grown plant (Woods, Shanks, and Cooley 14838) which is a part of the same population. The same differences can be observed in other plants, having grown in different ecological niches. A specimen

collected in a cedar (*Juniperus virginiana*) glade has leaves similar in form and size to the open-grown plant cited above. Leaves of this species may be extremely large. One such plant had leaves with a maximum length of 11 cm. The maximum leaf-length of the cedar glades plant cited above was 4 centimeters.

4. ***Ilex verticillata*** (L.) Gray. *Prinos verticillatus* Linn., Sp. Pl. (1753). *Prinos confertus* Moench, Meth. (1794). *Prinos Gronovii* Michx., Fl. Bor. Am. II (1803). *Prinos padifolius* Willd., Enum. Hort. Berol. (1809). *Prinos prunifolius* Desf., Tabl. ed. II (1815). *Prinos ambiguus* Michx. Fl. Bor. Am. II. 236. (1803). *Ilex verticillata* (L.) Gray. Man. Bot. N. U. S. ed. II (1856).—Shrub; leaves deciduous, obovate to ovate-lanceolate, dull above and sometimes with scattered hairs, pilose to tomentose midrib and veins below, membranous to sub-coriaceous, margin nearly entire to strongly doubly serrate; all flowers short stalked; calyx 5–7-merous, ciliate, glabrous to pubescent; drupe red; nutlets smooth or faintly ribbed.

*Distribution:* Swamps, bogs, and streamsides scattered throughout Tennessee. A plant of wet habitats. *Specimens Examined.*—BENTON: boggy meadow opposite Sandy Point School, Woods, Shanks & Cooley 13650 (T). CARROLL: bottoms of Crooked Creek north of Huntingdon, Woods, Shanks & Cooley 13739 (T). CARTER: swampy woods of Shady Valley, Sharp, Adams, Hernandez & Fairchild 11687 (T). CHESTER: west of Chickasaw State Park, Woods, Cooley & Shanks 9237 (T). COCKE: between Paint Rock and Del Rio, T. H. Kearney 634 (NH). CUMBERLAND: woods 20 miles north of Crossville, Sharp & Jennison 3390 (T). FENTRESS: boggy area along Glade Branch, Woods, Cooley & Shanks 14161 (T). GRUNDY: boggy meadow between Tracy City and Coalmont, Shanks, Sharp & E. Clebsch 5448 (T). HARDEMAN: low forested area at edge of lake in Chickasaw State Park, Woods, Shanks & Cooley 9227 (T). HARDIN: creek bank in Shiloh National Military Park, Woods, Shanks & Hardin 15691 (T). HENRY: bottoms along Tennessee River east of Paris, Sharp, Clebsch, Clebsch & Fairchild 7682 (T). JOHNSON: Cranberry bog 5 miles SW. of Mountain City, Woods, Shanks & Cooley 8709 (T). LINCOLN: wet woods on Hurley Hopkins' farm E. of Taft, Sharp, Clebsch & Clebsch 4898 (T). McNAIRY: near Moss Creek NW. of Ramer, Woods, Cooley & Shanks 14714 (T). SCOTT: sandy ridge at No Business Creek, Sharp, Shanks & E. Clebsch 3901 (T). SUMNER: Wild Goose Pond, Mitchellville, Woods, Shanks & Cooley 14304 (T). UNICOI: east Tennessee Mt. slopes at Unaka Springs, Albert Ruth 260 (G). WARREN: slightly boggy field one mile N. of Morrison, Woods, Shanks & Hardin 15769 (T). WAYNE: low hardwood forest, W. B. McDougall 1157 (NH). WEAKLEY: roadside bank near Hyndsver, Sharp, Clebsch & Clebsch August 12, 1947 (T).

The sporadic occurrence of *Ilex verticillata* throughout Tennessee is notable. Always found in boggy or otherwise wet habitats, it can often be distinguished from *Ilex montana* on an ecological basis, the latter being found in better drained habitats. This is often necessary in the mountains of eastern Tennessee, where the leaves of *I. verticillata* are sometimes very much like those of *I. montana*, and the flowers and fruit are not present.



Its apparent absence from the Mississippi River bottoms is enigmatic, since many seemingly favorable habitats are present in this region.

4a. *Ilex verticillata*, var. *padifolia* (Willd.) T. & G. *Ilex padifolius* Willd., Enum. Hort. Berol. (1809). *Ilex verticillata* var. *padifolia* (Willd.) T. & G. ex Wats. Bibl. Ind. N. Am. Bot. 160. (1878).

As in the typical phase of the species but with short appressed downy pubescence on lower surfaces of leaf blades as well as the ribs.

*Distribution*: Sporadic throughout the range of the species. *Specimens Examined*.—CHESTER: bottoms of S. Fork of Forked Deer, *Shanks, Clebsch & Clebsch 9431* (T). CUMBERLAND: near swamp woods 20 miles N. of Crossville, *Jennison 3399* (T). FENTRESS: edge of boggy woods, *Woods, Shanks & Cooley 14210* (T). McNAIRY: sweet bay-gum swamp at south edge of Bethel Springs, *Woods, Shanks & Cooley 14561* (T). MORGAN: shrubs along river, Rugby, *Svenson 9353* (G).

There are several collections of *Ilex verticillata* from Tennessee which the writer has determined as being var. *padifolia*. However, there is a cline between the extremely pubescent form and the glabrous form in which all degrees of variation can be found. The distinction between these is necessarily arbitrary.

5. *Ilex montana* T. & G. in Gray. *Ilex montana* T. & G. in Gray, Man. Bot. ed. I (1848). *Ilex ambigua* Torr., Fl. N. Y. ii (1843). Not *Prinos ambiguus* Michx., Fl. Bor. Am., ii (1803), source of the name. *Ilex monticola* Gray, Man. Bot. N. U. S. ed. II (1856). *Ilex Amelanchier* var. *monticola* Wood, Am. Bot. Fl. (1870). *Ilex dubia* var. *monticola* (Gray) Loesener, Mon. Aquifol. (Nov. Act. Abh. K. Leop.-Carol. Deutsch Akad. Naturforscher, lxxviii (1901). *Ilex ambigua* (Michx.) Chapm. sensu Gattinger, Flora of Tennessee (1901).—Shrub or small tree; leaves deciduous, ovate-lanceolate to elliptic, glabrous or with pubescence on midrib below, dull above, membranous to sub-coriaceous, serrate; staminate flowers clustered in the axils of leaves; calyx pubescent and sometimes ciliate; drupes red; nutlets strongly ribbed.

*Distribution*: Well drained slopes, ridges, and streamsides throughout eastern Tennessee. *Specimens Examined*.—ANDERSON: dry mixed woods above Norris Dam, *Iltis 2468* (T). BLOUNT: Gregory's Bald, GSMNP. S. A. Cain, August 9, 1929 (T). BRADLEY: near Cleveland, *E. C. Magee, October 1, 1941* (G). CARTER: along Hinkle Branch above Unaka School on Holston Mt., *Sharp 1800* (T). COCKE: steep, rocky, well-drained slope near top of Cosby Knob, GSMNP, *Jennison & Raper 3282* (PH, T). CUMBERLAND: among conglomerate boulders on top of Black Mt. 5 miles SE. of Crab Orchard, *Woods & Sharp 7435* (T). FRANKLIN: plateau, *C. Gailor, 129* (S). HAMILTON: west slopes at base of Lookout Mt., *McGilliard & Brown, June 6, 1951* (T). HARDIN: bluffs along Tennessee River south of Prospect, *Woods, Shanks & Cooley 14610* (T). JOHNSON: north slope of Iron Mountain, mixed mesophytic forest, *Woods, Shanks & Cooley 8797* (T). KNOX: woods on slope, U. T. Farm, *Sharp, October 4, 1947* (T). RHEA: bottom of gorge in virgin hemlock-white pine forest, Little Piney Creek, *Woods, Shanks & Cooley 13969* (T). SEVIER:

along trail to Jake's Gap, GSMNP, *Woods 7413*. SULLIVAN: roadside between Bristol and Shady Valley, Holston Mt., *Sharp 7416* (T). UNION: near the Gourd, *Mrs. Kelly 2122* (T). VAN BUREN: Fall Creek Falls State Park, *Shanks, Sharp & Clebsch 4500* (T).

*Ilex montana* is somewhat intolerant of shade and reaches its best form when growing in open sites on well drained soil. The writer has seen this species reach its best form and greatest frequency on an old burn with *Halesia carolina* and *Prunus pennsylvanica* (*Woods 7413*).

There seem to be two major races of mountain holly in Tennessee, the Cumberland form and the Unaka Range form. The former has leaves which are larger and more membranous than the latter, however, at one location visited by the writer in Cumberland County, the top of Black Mountain, the leaves of this species were much like the leaves of plants seen in the Unaka form. Here the specimens collected were on a dry and exposed site and shrubby in form, the largest specimen being only about 5 feet tall.

A single station for this species (*Woods, Shanks & Cooley 14610*) was found west of the Tennessee River. This location is isolated from the rest of the Tennessee populations, the nearest known stations are in Franklin County. It was found on a high and well drained bluff above the river.

5a. ***Ilex montana***, forma **rotundifolia** forma nov. *A typo differt foliis orbiculatis vel suborbiculatis.*

As in the typical species but with leaves which are as broad as they are long or slightly narrower.

*Distribution:* Franklin County. *Specimens Examined.*—FRANKLIN: Type specimen, plateau, *C. Gailor 123* (s).

The roundness of the leaves in this form is found only in the southern part of the state in the Cumberland Plateau populations. Between Franklin County and the northern part of the state can be found many degrees of variation in this characteristic. In general, it can be said that the further south one goes in Tennessee, the more pronounced the roundness of leaves becomes.

5b. ***Ilex montana***, var. **mollis** (Gray) Britton. *Ilex mollis* Gray, *Man. Bot. N. U. St.* ed. 5 (1867). *Ilex montana* var. *mollis* (Gray) Britton, *Bull. Torr. Bot. Club* XVII (1890). *Ilex dubia* Trelease ex Loesener in Koehne, *Deutsche Dendrol.* (1893). *Ilex monticola* var. *mollis* (Gray) Britton, *Mem.*

Torr. Bot. Club V (1894). *Ilex dubia* var. *mollis* (Gray) Loesener, Mon. Aqu. (1901). *Ilex montana* var. *mollis* forma *Grayana* Loesener, Mon. Aqu. (1901). *Ilex Beadlei* Ashe, Coult. Bot. Gaz. XXIV (1897). *Ilex dubia* var. *mollis* forma *Beadlei* (Ashe) Loesener, Mon. Aqu. (1901) *Ilex dubia* var. *Beadlei* (Ashe) Rehder, Man. Cult. Trees and Shrubs (1927). *Ilex Montana* var. *Beadlei* (Ashe) Fern., Rhodora XXXI (1939).

As in the typical form but pilose to densely whitish tomentose on the lower leaf surface.

*Distribution:* Confined to the central and eastern part of the state, with the degree of pubescence increasing from west to east. *Specimens Examined.*—ANDERSON: left fork of Cove Creek, W. A. Gresh, September 15, 1936 (T). BLOUNT: pine woods on Chilhowee Mt., GSMNP, Jennison & Fleetwood 1886 (PH). CAMPBELL: valley of Stinking Creek SE. of Elk Valley, Charles Gibson, no date (T). COCKE: with black pine at Point Creek, W. W. Ashe, October 13, 1922 (NC). CUMBERLAND: among conglomerate boulders on top of Black Mt. 5 miles SE. of Crab Orchard, Woods & Sharp 7436 (T). GRAINGER: Clinch Mt. on U. S. 25E, S. A. Cain, May 13, 1945 (T). GRUNDY: head of Fiery Gizzard Cove, Tracy City, Shanks, Sharp & E. Clebsch 5331 (T). POLK: ridge N. of Hiwassee River, W. A. Dayton 674 (FS). RHEA: Edwards Branch of Soak Creek, Woods, Shanks & Cooley 14022 (T). ROANE: dry thin woods, escarpment of Cumberland plateau west of Rockwood, C. A. & U. F. Weatherby 6223 (G). UNICOI: near Nolichucky River, near Erwin, R. S. James, July 4, 1949 (UN). VAN BUREN: Falls Creek Falls State Park, Shanks, Sharp, & Clebsch 4512 (T). WASHINGTON: white pine-hardwood forest SW. of Jonesboro, Sharp & Shanks 7460 (T).

It is desirable, at least in Tennessee, to let var. *mollis* represent the pubescent form of *Ilex montana*. Ashe, in describing *Ilex Beadlei*, states that it is distinct from var. *mollis*, but gives no qualitative or quantitative data to show that this is true. Nor is there a disjunction in range between the two forms. It is true that as one moves further south in the United States or further east to the mountains in Tennessee, specimens examined change in character, becoming more pubescent and having a more woolly appearance on the lower leaf surface. However, in neither case is there a geographical disjunction or a distinct break in morphological characteristics. For this reason, the work of Loesener is being followed in this matter and the more pubescent form, sometimes called *Ilex Beadlei*, is treated as the extreme form of the pubescent variety of *Ilex montana*.

#### SUMMARY AND CONCLUSIONS

Five species of the genus *Ilex* occur in Tennessee. These are: *I. opaca*, with forma *subintegra* and forma *xanthocarpa*; *I. decidua*; *I. longipes*; *I. verticillata*, with var. *padifolia*; and *I. montana*,

with var. *mollis*. A new form of *I. montana*, forma *rotundifolia*, is proposed. Species limits are sometimes difficult to determine because of clines of gradation which are present between some of the species and varieties.

The study of this whole genus, in Tennessee, is now at a point where the tools of cyto-taxonomy can probably be used to advantage. With the use of such tools as these, the student should be able to arrive at solutions resolving the problems of the inter- and intra-relationships of the various species. Since the problems involved in each genus of plants are unique, so are their solutions. It is quite possible that taxonomic methods not yet used must be developed in order to understand *Ilex* satisfactorily.

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EPIPACTIS HELLEBORINE (L.) CRANTZ IN  
MICHIGAN, AND ITS GENERAL RANGE  
IN NORTH AMERICA

W. B. DREW AND R. A. GILES

IN 1933, Dr. Homer D. House published an interesting account in *Torreyia* (*Torreyia* 33: 133–135. 1933) concerning the spread in New York State of the orchid then known as *Serapias Helleborine* L. He showed that there had been a very considerable westward extension of its range in New York during a period of 54 years. Indeed, this adventive from the Old World is a rather exceptional plant among orchids in North America, since its biological behavior suggests an aggressiveness not commonly associated with temperate members of the Orchidaceae.

On August 16, 1940, a small colony of this orchid was discovered by Giles in moist, alluvial soil along the Red Cedar River not far from the well travelled entrance to one of the woodlots on the campus of Michigan State College in East Lansing. The colony has since been depleted because of cordwood piled upon the area during the winter and spring of 1947–1948. Moreover, *Epipactis Helleborine* competes here with a tangle of *Cynachum nigrum* (L.) Pers. under the shade of *Ptelea trifoliata* L.